Resorbable Synthetic Mesh Supported With Omentum Flap in the Treatment of Giant Hiatal Hernia

F. J. Pérez Lara, R. Marín, A. del Rey, H. Oliva

Digestive Surgery Department, Antequera Hospital, Málaga, Spain

Covering a large hiatal hernia with a mesh has become a basic procedure in the last few years. However, mesh implants are associated with high complication rates (esophageal erosion, perforation, fistula, etc.). We propose using a synthetic resorbable mesh supported with an omental flap as a possible solution to this problem. A 54-year-old female patient with a large hiatal defect (9 cm) was laparoscopically implanted with a synthetic resorbable mesh supported with an omental flap. The surgical procedure was successful and the patient was discharged on postoperative day 2. On a follow-up examination 6 months after surgery, she remained free of relapse or complication signs. Supporting an implanted resorbable mesh with an omental flap may be a solution to the problems posed by large esophageal hiatus defects. However, more studies based on larger patient samples and longer follow-up periods are necessary.

Key words: Giant hiatal hernia – Resorbable mesh – Omentum

Postintervention recurrence of hiatal hernia is a well-documented complication.¹ Although the use of various synthetic materials drastically reduces the recurrence of hernia after laparoscopic hiato-plasty, the associated side effects, such as adherence formation, mesh shrinkage, and tissue erosion continue to be a major problem.² Recent incorporation of new bioprosthetic materials, developed with the aim of reducing mesh-related complications, extended the use of mesh reinforcement to patients at high risk

of recurrence³ with lower expected recurrence rates and without the side effects of nonresorbable meshes.

Studies reported that the use of biologic meshes in patients with hiatal hernia was free of long-term adverse effects,⁴ although further studies with larger patient samples are required.^{5,6}

A major problem associated with this type of mesh concerns their high cost.⁷ As an alternative, synthetic resorbable meshes may be used. However, this type of mesh requires the presence of a

Reprint requests: Francisco Javier Pérez Lara, Digestive Surgery Department, Antequera Hospital, Urb Jardines del Golf Fase 4 n° 33, Añoreta, Rincón de la Victoria, Málaga, C.P. 29730, Spain.

Tel.: +63 73 221 33; Fax: 95 20 327 00; E-mail: javinewyork@hotmail.com

Fig. 1 Preoperative gastroduodenal series showing the whole stomach (with organo-axial rotation) into the thoracic space.

substrate where fibrous tissue can be formed, so that the structure remains after mesh resorption. Thus, bioprosthetic meshes would not be suitable for patients with large hiatal defects, where the pillars cannot be brought close together and there is no tissue to support the mesh. We propose that synthetic resorbable meshes can actually be used in such patients, although covering the mesh with an omental flap on the area of the defect. The omentum would thus provide a substrate for the formation of fibrous tissue and repair of the defect.

Here we report the case of a patient with a large hiatal defect, which was surgically repaired by implanting a synthetic resorbable mesh with an omental flap as a substrate for mesh integration with good results both postoperatively and after 6 months' followup.

Methods

A female 54-year old patient, with previous (10 years earlier) surgery for left breast cancer (mastectomy and lymphadenectomy of the axilla) plus postoperative chemotherapy, presented with pain

and a feeling of fullness in the chest. She was examined by a gastroenterologist by means of thoracic-abdominal CAT, which revealed a large hiatal hernia with diastasis of the diaphragmatic pillars and gastric volvulus, which contained a portion of the transverse colon (the splenic flexure). A subsequent endoscopic study showed a large sliding hiatal hernia without signs of esophagitis. A gastroduodenal series revealed organo-axial rotation of the stomach with a large portion of this organ into the thoracic space while only the antrum remained into the abdominal space (Fig. 1). After reaching a diagnosis of giant sliding hiatal hernia the patient was submitted to laparoscopic intervention. Surgical findings were: large hiatal hernia containing the whole of the stomach and a portion of the transverse colon (Fig. 2). During the surgical procedure, the abdominal content was returned into place, Nissen fundoplication was performed and, due to the large size of the hiatus (9 cm in diameter), a synthetic bio-absorbable mesh was implanted, attached to the pillars and the phreno-esophageal membrane with a crown of single silk suture stitches. Subsequently, an omental flap including two or three gastroepiploic vessels was obtained from the area with better access to the hiatus without stress and was sutured to the mesh also with a crown of single silk suture stitches (Figs. 3 and 4).

Results

The postoperative period was uneventful and the patient was discharged 2 days after intervention. In a followup visit, 6 months after surgery, gastroduodenal series and abdominal CAT showed that the

Fig. 2 Hernia contents released and returned into the abdominal space. Notice that the hiatal defect was larger than 9 cm in diameter.

Fig. 3 Placement of a synthetic mesh to cover the defect.

stomach and the fundoplication were into the abdominal space (Fig. 5). The patient remained asymptomatic (16 months followup), without complaints of thoracic fullness or gastro-esophageal reflux.

Discussion

Hiatal hernias are classified into four different types: type I (sliding), type II (para-esophageal), type III (mixed) and type IV (complex); the latter type is associated with large defects that allow other organs, such as colon, spleen, pancreas, and small intestine to enter the hernia sac.⁸ Co-occurrence of a colonic hernia is a rare finding, much more frequently observed in large para-esophageal hernia than in sliding hernia.⁹ Type IV hiatal hernias, i.e., those with intra-abdominal contents such as intestine and omentum, are rare.¹⁰ Anatomic failure of surgical repair, which occurs at rates of 15% to 25%, has been mainly attributed to the effects of stressors on the attenuated and weakened muscle fibers of the

Fig. 4 Omental flap on the mesh, providing tissue for granulation.

Fig. 5 Gastroduodenal series 6 months postoperatively showing that the stomach and fundoplication remain within the abdominal space.

hiatal crura.¹¹ Although the occurrence of severe symptoms requires surgical review, these appear in less than 3% of relapse cases.^{12,13} From the clinical point of view, the first description of the use of prosthetic material to reinforce hiataloplasty was published by Fusco in 1960.¹⁴

The use of prosthetic material, routinely or in cases of large hiatal defects, has been proposed with the aim of reducing recurrence rates below 10%.^{15,16} Although the use of a number of synthetic materials dramatically reduced the relapse rates of hernia, polypropylene meshes continue to be the most extensively used ones, followed by PTFE meshes.¹⁷

Para-esophageal hiatal hernias are associated with high risk of death and severe complications, including volvulus, obstruction, hemorrhage and perforation¹⁸ and with high relapse rates following repair,^{3,4} which are however significantly lower with SIS meshes (9%) than with primary repair (24%).⁶ Thus, the use of meshes has been demonstrated to reduce recurrence.^{19,20} However, synthetic meshes entail the risk of producing erosion in adjacent structures (e.g. esophagus, stomach), fibrosis around the esophagus and formation of fistulae on the adjacent organs^{20–23}, a complication associated with

severe dysphagia.^{20,24} In view of these problems, biologic absorbable products seem to be the most suitable choice to reduce recurrence without increasing complications.

The surgical approach to large hiatal hernia repair is still a matter of debate. Controversial issues include: routine use of mesh reinforcement, need to perform an esophageal extension procedure, and routine fundoplication. Resolving these questions requires studies with larger patient samples than the currently published ones.²⁵ Consequently, the optimal type of mesh and the implantation technique still have to be established.¹⁷

In an attempt to prevent the above described complications, biologic resorbable meshes have been developed, which are, however, associated with high costs. Therefore, we preferred to use a synthetic resorbable mesh (with much lower cost) porous, nonwoven and with a high degree of pore interconnection. Such meshes can be used to reinforce tissues and to provide support for cell infiltration during the healing process, while the organism gradually absorbs the biomaterial and substitutes it by native tissue. For this process to occur successfully, a large portion of the mesh has to be in contact with the patient's tissues.

Biologic implants used to repair abdominal wall and hernia defects are made from 5 types of tissue: acellular bovine pericardium (ABP; Tutomesh/Tutogen Medical GmbH Germany Human cadaveric dermis, Veritas/Synovis), human cadaveric dermis (HCD; Alloderm/LifeCell Corp., Branchburg, NJ), FlexHD/Ethicon 360, (Ethicon Inc., Somerville, NJ), porcine small intestine submucosa (SIS; Surgisis/Cook, Bloomington, Indiana), crosslinked porcine dermal collagen (PDC; Pelvicol and CollaMend/Bardo, Permacol/Covidien, Loughlinstown, Dublin), and porcine skin implants.³

Since pericardial injuries produced by the tackers used to fix the mesh have been reported,²⁶ we preferred to fix the mesh with isolated stitches. Some surgeons propose suturing the hiatus before placing the mesh,¹⁷ with a maximum of 2 or 3 stitches behind the esophagus and with any additional stitches, if needed, in a position anterior to the esophagus, in order to reduce stress on large hiatal defects.²⁷ Other surgeons prefer to implant the mesh on a widened hiatal orifice, since anterior closure may be unnecessary or result in excessive stress.¹⁷ In the presented case, the large distance between the pillars made it technically impossible to close the hiatus. Therefore, a technical modification (use of an omental flap) was applied, to provide the

mesh with supporting tissue, where it could get integrated. In this way, when the mesh was resorbed, some 5 or 6 months later, it would be replaced by a resistant fibrous surface created on the omentum, which would serve as a permanent barrier to avoid relapse.

In summary, we propose that implantation of a synthetic resorbable mesh may be a good solution to the complex problem of a large hiatal defect, where closing the pillars is not possible, provided that an omental flap is used as a substrate for mesh integration before resorption. The complications and relapse rates in patients undergoing such a treatment are still to be evaluated.

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